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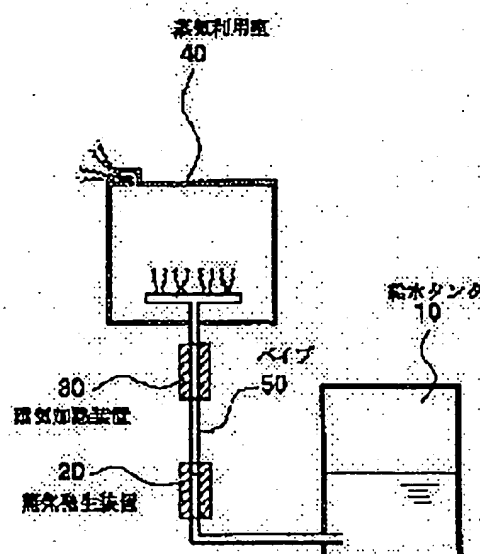
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(54) SYSTEM FOR UTILIZING HIGH TEMPERATURE STEAM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a compact and safe system for utilizing high temperature steam capable of being installed even in a narrow space and without generation of high pressure steam.

SOLUTION: In a system wherein a pipe 50 is provided between a water supply tank 10 and a steam-utilizing chamber 40, and the pipe 50 is provided with a steam generator 20 having an electromagnetic induction heating heater, the pipe 50 between the steam generator 20 and the steam-utilizing chamber 40 is provided with a steam-heating apparatus 30 having an electromagnetic induction heating heater.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to an elevated-temperature steamy use facility. Especially, it is related with the suitable elevated-temperature steamy use facility for a steamer, a sterilizer, and a noodles defrosting machine.

[0002]

[Description of the Prior Art] Drawing 7 is the block diagram of the conventional elevated-temperature steamy use facility. In this drawing, the sign 10 shows the feed water tank which can collect water. Sign 120 The steamy generating room is shown. This steamy generating room 120 In the lower part, it is the steamy generating room 120. Burner 121 which heats internal water It is prepared. The sign 40 shows the steamy use room using a hot steam, for example, a steamer etc. The aforementioned feed water tank 10 and steamy generating room 120 In between, it is pipe 50a. It connects. this pipe 50a **** -- the water of a feed water tank 10 -- steamy generating room 120 The feed pump 60 for sending is attached. The aforementioned steamy generating room 120 Between the steamy use rooms 40, it is air-supply pipe 50b. It connects. This air-supply pipe 50b Burner 121 In between, it is a burner 121. Gas duct 122 along which the occurring hot exhaust gas passes It is prepared and is air-supply pipe 50b. The circumference is the steamy heating apparatus 123. It has become. That is, burner 121 Hot exhaust gas is a gas duct 122. It passes and is air-supply pipe 50b. It has structure to heat. By the conventional elevated-temperature steamy use facility of this composition, the water of a feed water tank 10 is pipe 50a by the aforementioned feed pump 60 first. It leads and is the steamy generating room 120. Water is supplied. This steamy generating room 120 Water is a burner 121. It is heated and becomes a steam more than 100 **. this steam -- air-supply pipe 50b while passing -- steamy heating apparatus 123 setting -- the aforementioned burner 121 from -- it is heated by the occurring hot exhaust gas, and the steamy use rooms 40, such as a steamer, are fed Therefore, the hot steam can be used at the steamy use room 40.

[0003]

[Problem(s) to be Solved by the Invention] However, steamy generating room 120 in the conventional elevated-temperature steamy use facility The storage-of-water room of the lower part which collects water, and the steam chest of the upper part which collects a steam are required, and it is large-sized, and is expensive. For this reason, the conventional elevated-temperature steamy use facility needs a space large-sized as a whole and remarkable, and has the problem of being expensive. Moreover, in order to make into an elevated temperature temperature of the steam supplied to the steamy use room 40, it is the steamy generating room 120. It is necessary to make the interior into high pressure. For this reason, steamy generating room 120 It is necessary to make it the structure where high pressure can be borne, and the facility is expensive and, moreover, has the problem that a space is required. Furthermore, it is the steamy generating room 120 about the steam supplied to the steamy use room 40. In order to make it an elevated temperature more nearly further than internal temperature, it is air-supply pipe 50b like ****. Steamy heating apparatus 123 of the heat-exchange formula using exhaust gas It prepares and the steam is heated. For this reason, steamy heating apparatus 123 of the heat-exchange formula using exhaust gas In order to install, there is a problem that a latus space is required.

[0004] In view of this situation, even if this invention is a small and narrow space, it can be installed, and it aims at offering a safe elevated-temperature steamy use facility, without generating a high-pressure steam.

[0005]

[Means for Solving the Problem] The pipe with which the elevated-temperature steamy use facility of a claim 1 was formed between the feed water tank, the steamy use room, and the aforementioned feed water tank and the aforementioned steamy use room, In the facility which consists of a steam generator equipped with the heater of an electromagnetic-induction heating method attached in the aforementioned pipe between the aforementioned feed water tank and the aforementioned steamy use room It is characterized by forming the steamy heating apparatus which equipped the aforementioned pipe between the aforementioned steam generator and the aforementioned steamy use room with the heater of an electromagnetic-induction heating method. The pipe with which the elevated-temperature steamy use facility of a claim 2 was formed between the feed water tank, the steamy use room, and the aforementioned feed water tank and the aforementioned steamy use room, In the facility which consists of a steam generator equipped with the heater of an electromagnetic-induction heating method attached in the aforementioned pipe between the aforementioned feed water tank and the aforementioned steamy use room The end of a guard tube is connected to the pipe between the aforementioned steam generator and the aforementioned steamy use room, and it is characterized by arranging the other end of this guard tube in the interior of the upper part of the aforementioned feed water tank. An elevated-temperature steamy use facility of a claim 3 is characterized by preparing a temperature sensor in the interior of the aforementioned steamy use

room, and forming the controller which controls each amount of heating of the aforementioned steam generator and steamy heating apparatus according to the detection temperature detected by this temperature sensor. An elevated-temperature steamy use facility of a claim 4 is characterized by preparing a temperature sensor in the interior of the aforementioned steamy use room, and forming the controller which controls the amount of heating of the aforementioned steam generator according to the detection temperature detected by this temperature sensor. An elevated-temperature steamy use facility of a claim 5 is characterized by using the aforementioned steamy use room as a steamer. An elevated-temperature steamy use facility of a claim 6 is characterized by using the aforementioned steamy use room as a sterilizer which sterilizes various germs. An elevated-temperature steamy use facility of a claim 7 is characterized by using the aforementioned steamy use room as a noodles defrosting machine which thaws frozen noodles.

[0006]

[Embodiments of the Invention] Below, the operation gestalt of this invention is explained based on a drawing. Drawing 1 is the block diagram of an elevated-temperature steamy use facility of the 1st operation gestalt. In this drawing, the sign 10 shows the feed water tank which can collect water. In the elevated-temperature steamy use facility of the 1st operation gestalt, the end of a pipe 50 is connected to the feed water tank 10, and the other end of this pipe 50 is arranged in the interior of the steamy use room 40. This steamy use room 40 is explained in full detail later. In addition, various tanks can be used for a feed water tank 10 that what is necessary is just to be able to store water in water. Further in addition, a pipe 50 can adopt various pipes, such as ceramics, a steel pipe, stainless steel, and a resin.

[0007] The steam generator 20 is attached in the low position from the water surface inside a feed water tank 10 at this pipe 50. Moreover, the steamy heating apparatus 30 is attached in the position higher than the water surface inside a feed water tank 10 to the pipe 50 between this steam generator 20 and the steamy use room 40. Water is always contained in the interior of the pipe 50 of a portion in which this steam generator 20 was attached, and water is not contained in the pipe 50 of the portion in which the steamy heating apparatus 30 was attached.

[0008] Now, as for these steam generators 20 and the steamy heating apparatus 30, all are using the heater as the heater 21 of an electromagnetic-induction heating method. Drawing 2 is the cross section of the heater 21 of an electromagnetic-induction heating method. As shown in this drawing, it consists of a coil 22 wound around the periphery of a pipe 50, and a heating element 23 contained inside the pipe 50 in the heater 21 of an electromagnetic-induction heating method. A coil 22 is what formed copper tubes, such as what current is passed and twisted litz wire, a round pipe, a semi-tube, and an ellipse pipe, in the shape of a coil. A heating element 23 generates heat by the magnetic field generated by passing current in a coil 22, and is carrying out structure through which the water of the pipe 50 interior can moreover pass from an end to the other end. Moreover, the heat-exchange efficiency between the water and the heating elements 23 passing through the interior of a pipe 50 changes with configurations of a heating element 23. For this reason, it is suitable if it is made configurations, such as the configuration through which is a configuration which is made to increase a touch area with water for the configuration of a heating element 23, and improves heat-exchange efficiency, and water can pass from an end to the other end, for example, a honeycomb structure etc.

[0009] In addition, although electromagnetic-induction heating apparatus given in JP,8-264272,A is used as a heater 21 of an electromagnetic-induction heating method with sufficient heat-exchange efficiency, the heater of not only this but various electromagnetic-induction heating methods can be adopted.

[0010] It comes, whenever a two-dot chain line shows, when current is passed in the coil 22 of the heater 21 of this electromagnetic-induction heating method, and a magnetic field occurs. A heating element 23 is heated by this magnetic field. By the heat exchange between this heating element 23 and the water passing through the interior of a pipe 50, water serves as a steam in an instant.

[0011] Since a steam generator 20 and the steamy heating apparatus 30 are all the heaters 21 of an electromagnetic-induction heating method, its all are small. Moreover, since the temperature of a steam is raised by making the steam generated in the steam generator 20 heat with the steamy heating apparatus 30, it is the proof-pressure structure 2, for example, 1 kgf/cm, about a pipe 50. It is not necessary to make it the structure of bearing the above high pressure. And like [a steam generator 20] the pipe 50, since it is not necessary to make it proof-pressure structure, one pipe 50 can be made to be able to approach and a steam generator 20 and the steamy heating apparatus 30 can be attached in it. Therefore, an elevated-temperature steamy use facility of the 1st operation gestalt does so the effect that it can install also in a small and narrow space.

[0012] Below, an operation and effect of an elevated-temperature steamy use facility of the 1st operation gestalt are explained. As again shown in drawing 1, water is first stored to the feed water tank 10. If a feed pump 60 is made to drive, while passing along a pipe 50 and feeding the steamy use room 40, the water of a feed water tank 10 will be first heated by the steam generator 20, and will serve as a steam.

[0013] Subsequently, while passing along the interior of a pipe 50 and feeding the steamy use room 40, this steam is heated by the steamy heating apparatus 30, and turns into a hot steam more than 100 °C.

[0014] The steamy use room 40 is fed with this hot steam through a pipe 50, and it is used for various uses at the steamy use room 40.

[0015] Below, some optimal examples of a use for the steamy use room 40 are explained. As the 1st use, it is good to use the steamy use room 40 as a steamer. In this case, if frozen foods, such as food, such as chawan-mushi, and a steamed meat dumpling, a rice dumpling in bamboo leaves, and a frozen steamed bun with meat, are put into the steamy use room 40, it can steam puffily. Since an elevated-temperature steamy use facility of the 1st operation gestalt is small, it can be installed in a store etc., it can be used immediately to use it, and does so the effect that a steamed cake can be cooked.

[0016] It is good to use the steamy use room 40 as the 2nd use as a sterilizer which sterilizes various germs. In this case, if

medical devices and tablewares, such as a syringe and scissors, are put into this steamy use room 40, the various germs adhering to the medical device etc. can be sterilized. Since an elevated-temperature steamy use facility of the 1st operation gestalt is small, it can be installed in a work shop etc. and it can be used immediately to use it, and it does so the effect that various germs can be sterilized completely.

[0017] It is good to use as a noodles defrosting machine which thaws the frozen noodles by which Japanese noodles, the buckwheat, etc. were frozen in the steamy use room 40 as the 3rd use. In this case, if frozen noodles are put into the steamy use room 40, frozen noodles will turn into noodles, such as soft Japanese noodles and a buckwheat, without being thawed and spoiling flavor and mouthfeel. Since an elevated-temperature steamy use facility of the 1st operation gestalt is small, it can be installed in a store etc. and it can be used immediately to use it, and it does so the effect of the ability to make frozen noodles thaw.

[0018] Below, an elevated-temperature steamy use facility of the 2nd operation gestalt is explained. Drawing 3 is the block diagram of an elevated-temperature steamy use facility of the 2nd operation gestalt. As shown in this drawing, the steamy heating apparatus 30 is removed from an elevated-temperature steamy use facility of the 1st operation gestalt, and, as for an elevated-temperature steamy use facility of the 2nd operation gestalt, a guard tube 51 is attached. Specifically, the steamy heating apparatus 30 is removed from an elevated-temperature steamy use facility of the 1st operation gestalt, and an elevated-temperature steamy use facility of the 2nd operation gestalt connects the end of a guard tube 51 to the pipe 50 between a feed water tank 10 and a steam generator 20, and arranges the other end of this guard tube 51 in the upper part of a feed water tank 10.

[0019] For this reason, an elevated-temperature steamy use facility of the 2nd operation gestalt does so the same effect as an elevated-temperature steamy use facility of the 1st operation gestalt, i.e., the effect that it can install also in a small and narrow space.

[0020] And since the internal pressure of a pipe 50 can be missed by the guard tube 51 even if in an elevated-temperature steamy use facility of the 2nd operation gestalt water is heated, it becomes a steam and volume increases rapidly by the steam generator 20, it can prevent that the internal pressure of a pipe 50 turns into high pressure, and the effect of being safe is done so. Moreover, in an elevated-temperature steamy use facility of the 2nd operation gestalt, since the proof-pressure facility is unnecessary, the effect that it can manufacture cheaply is done so. Of course, in an elevated-temperature steamy use facility of the 2nd operation gestalt, it is not necessary to say that the steamy use room 40 can be used for various uses, such as a steamer, and a sterilizer, a noodles defrosting machine, like an elevated-temperature steamy use facility of the 1st operation gestalt.

[0021] Below, an elevated-temperature steamy use facility of the 3rd operation gestalt is explained. Drawing 4 is the block diagram of an elevated-temperature steamy use facility of the 3rd operation gestalt. As shown in this drawing, as for an elevated-temperature steamy use facility of the 3rd operation gestalt, a temperature sensor 41 and a controller 42 are attached in an elevated-temperature steamy use facility of the 1st operation gestalt. Specifically, a temperature sensor 41 is attached in the interior of the steamy use room 40 in an elevated-temperature steamy use facility of the 1st operation gestalt, an elevated-temperature steamy use facility of the 3rd operation gestalt receives the temperature detection signal from this temperature sensor 41, and the controller 42 which controls a steam generator 20 and the steamy heating apparatus 30 based on this temperature detection signal is formed. In addition, the installation position of a temperature sensor 41 may be the pipe 50 between not only the interior of the steamy use room 40 but the steamy use room 40, and the steamy heating apparatus 30.

[0022] This temperature sensor 41 is a sensor which detects the temperature inside the steamy use room 40, and sends a temperature signal to a controller 42. By controlling the amount of heating of a steam generator 20 or the steamy heating apparatus 30 by the controller 42 as compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41. The heating value to the heated object inside the steamy use room 40 is controlled by controlling the steam temperature in the amount of generating steams and the steamy heating apparatus 30 in a steam generator 20, and adjusting the amount of steams and steam temperature which are supplied to the steamy use room 40.

[0023] An elevated-temperature steamy use facility of the 3rd operation gestalt does so the same effect as an elevated-temperature steamy use facility of the 1st operation gestalt, i.e., the effect that it can install also in a small and narrow space.

[0024] According to the elevated-temperature steamy facility of the 3rd operation gestalt, if the internal temperature of the steamy use room 40 rises, a temperature sensor 41 will detect the internal temperature of the steamy use room 40, and will transmit a temperature signal to a controller 42. By the controller 42, as compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41, the steam temperature in the amount of generating steams or the steamy heating apparatus 30 in a steam generator 20 decreases or falls, and the amount of steams or steam temperature supplied to the steamy use room 40 decreases or falls by decreasing the amount of heating of a steam generator 20 or the steamy heating apparatus 30. That is not right, and if the internal temperature of the steamy use room 40 descends, a temperature sensor 41 will detect the internal temperature of the steamy use room 40, and will transmit a temperature signal to a controller 42. By the controller 42, as compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41, the steam temperature in the amount of generating steams or the steamy heating apparatus 30 in a steam generator 20 increases or rises, and the amount of steams or steam temperature supplied to the steamy use room 40 increases or rises by making the amount of heating of a steam generator 20 or the steamy heating apparatus 30 increase. In addition, the predetermined temperature beforehand stored in a controller 42 may be the predetermined temperature region where it did not restrict but the upper limit and the lower limit were set up in one point. In this case, the temperature of the steamy use room 40 does so the effect of being maintained, between the predetermined minimum temperature and predetermined upper limit temperature in the area within predetermined temperature.

[0025] Below, an elevated-temperature steamy use facility of the 4th operation gestalt is explained. Drawing 5 is the block diagram of an elevated-temperature steamy use facility of the 4th operation gestalt. As shown in this drawing, as for an elevated-temperature steamy use facility of the 4th operation gestalt, a temperature sensor 41 and a controller 42 are attached in an elevated-temperature steamy use facility of the 2nd operation gestalt. Specifically, a temperature sensor 41 is attached in the interior of the steamy use room 40 in an elevated-temperature steamy use facility of the 2nd operation gestalt, an elevated-temperature steamy use facility of the 4th operation gestalt receives the temperature detection signal from this temperature sensor 41, and the controller 42 which controls a steam generator 20 based on this temperature detection signal is formed. In addition, the installation position of a temperature sensor 41 may be the pipe 50 between not only the interior of the steamy use room 40 but the steamy use room 40, and a steam generator 20.

[0026] This temperature sensor 41 is a sensor which detects the temperature inside the steamy use room 40, and sends a temperature signal to a controller 42. As compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41, by controlling the amount of heating of a steam generator 20, the amount of generating steams in a steam generator 20 is controlled and adjusted, and the heating value to the heated object inside the steamy use room 40 is controlled by the controller 42.

[0027] An elevated-temperature steamy use facility of the 4th operation gestalt does so the same effect as an elevated-temperature steamy use facility of the 2nd operation gestalt, i.e., the effect that it can install also in a small and narrow space.

[0028] According to the elevated-temperature steamy use facility of the 4th operation gestalt, if the internal temperature of the steamy use room 40 rises, a temperature sensor 41 will detect the internal temperature of the steamy use room 40, and will transmit a temperature signal to a controller 42. By the controller 42, as compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41, the amount of generating steams in a steam generator 20 decreases or falls, and the amount of steams supplied to the steamy use room 40 decreases or falls by decreasing the amount of heating of a steam generator 20. That is not right, and if the internal temperature of the steamy use room 40 descends, a temperature sensor 41 will detect the internal temperature of the steamy use room 40, and will transmit a temperature signal to a controller 42. By the controller 42, as compared with the predetermined temperature which stored in the controller 42 beforehand the temperature detected by the temperature sensor 41, the amount of generating steams in a steam generator 20 increases or rises, and the amount of steams supplied to the steamy use room 40 increases or rises by making the amount of heating of a steam generator 20 increase. In addition, the predetermined temperature beforehand stored in a controller 42 may be the predetermined temperature region where it did not restrict but the upper limit and the lower limit were set up in one point. In this case, the temperature of the steamy use room 40 does so the effect of being maintained, between the predetermined minimum temperature and predetermined upper limit temperature in the area within predetermined temperature.

[0029] the [the 3rd operation gestalt or] -- when the steamy use room 40 in 4 operation gestalten is used as a steamer, it is good to make about 60-degree-C predetermined upper limit temperature into about 100 ** for predetermined minimum temperature. Moreover, when using the steamy use room 40 as a sterilizer, it is good to make 110 ** and predetermined upper limit temperature into 150 ** for predetermined minimum temperature. Furthermore, when using the steamy use room 40 as a noodles defrosting machine, it is good to make 100 ** and predetermined upper limit temperature into 170 ** for predetermined minimum temperature. Thus, since the predetermined minimum temperature and predetermined upper limit temperature of the steamy use room 40 can be changed according to a use, the effect that it can be used for various uses is done so. Of course, in an elevated-temperature steamy use facility of the 3rd operation gestalt or the 4th operation gestalt, it is not necessary to say that the steamy use room 40 can be used for various uses, such as a steamer, and a sterilizer, a noodles defrosting machine, like an elevated-temperature steamy use facility of the 1st operation gestalt or the 2nd operation gestalt.

[0030] Drawing 6 is the block diagram of other examples of the steamy use room 40 in an elevated-temperature steamy use facility of the 1st - the 4th operation gestalt. As shown in this drawing, if ventilating-fan f is attached in the exhaust port of the steamy use room 40, in an elevated-temperature steamy use facility of the 1st - the 4th operation gestalt, many steams can be supplied by the steamy use room 40. Further in addition, although not illustrated, if a feed pump is attached in a pipe 50, much more steams can be supplied to the steamy use room 40.

[0031]

[Effect of the Invention] According to the elevated-temperature steamy use facility of a claim 1, since each of steam generators and steamy heating apparatus can be made small, it can do small as a whole, and even if it is a narrow space, it can install. Since according to the elevated-temperature steamy use facility of a claim 2 the internal pressure of a pipe cannot rise more than a constant pressure since the internal pressure of a pipe escapes inside a feed water tank, but the steamy leakage by high pressure can be prevented and the pipe which is not proof-pressure structure can be used, it can manufacture cheaply. According to the elevated-temperature steamy use facility of a claim 3, according to a use, since an optimal-temperature band can be changed, the optimal-temperature band of a request of the temperature of a steamy use room can be maintained, consequently it can be used for various uses. According to the elevated-temperature steamy use facility of a claim 4, according to a use, since an optimal-temperature band can be changed, the optimal-temperature band of a request of the temperature of a steamy use room can be maintained, consequently it can be used for various uses. According to the elevated-temperature steamy use facility of a claim 5, since it is small, it can install in a store etc., and it can be used immediately to use it, and a steamed cake can be cooked. According to the elevated-temperature steamy use facility of a claim 6, since it is small, it can install in a work shop etc. and can be used immediately to use it, and various germs can be sterilized completely. Frozen noodles can be thawed without according to the elevated-temperature steamy use facility of a claim 7, being able to install in a store etc., being able to use it immediately and spoiling flavor and mouthfeel using it, since it is small.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of an elevated-temperature steamy use facility of the 1st operation gestalt.

[Drawing 2] It is the cross section of the heater 21 of an electromagnetic-induction heating method.

[Drawing 3] It is the block diagram of an elevated-temperature steamy use facility of the 2nd operation gestalt.

[Drawing 4] It is the block diagram of an elevated-temperature steamy use facility of the 3rd operation gestalt.

[Drawing 5] It is the block diagram of an elevated-temperature steamy use facility of the 4th operation gestalt.

[Drawing 6] It is the block diagram of other examples of the steamy use room 40 in an elevated-temperature steamy use facility of the 1st - the 4th operation form.

[Drawing 7] It is the block diagram of the conventional elevated-temperature steamy use facility.

[Description of Notations]

10 Feed Water Tank

20 Steam Generator

21 Heater of Electromagnetic-Induction Heating Method

30 Steamy Heating Apparatus

40 Steamy Use Room

41 Temperature Sensor

42 Controller

50 Pipe

[Translation done.]